DOCUMENT RESUME

ED 114 266 SE 019 159

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TITLE Major Findings of the Survey from an NSF Point of View.
PUB DATE 31 Mar 75
NOTE 17p.; Paper presented at the Annual Meeting of the American Educational Research Association (Washington, D.C., March 30-April 3, 1975); Occasional marginal legibility on charts

EDRS PRICE MF-$0.76 HC-$1.58 Plus Postage
DESCRIPTORS Doctoral Programs; *Educational Finance; Engineering Education; *Enrollment Trends; Financial Support; *Graduate Study; Higher Education; Science Education; *Surveys
IDENTIFIERS *National Science Foundation; NSF

ABSTRACT

In this paper a review of the major findings of the 1973 Survey of Graduate Science Study Support is presented. Results are compared with similar studies which go back through 1967 and a survey conducted in the fall of 1974 of 360 graduate science departments. From the studies, it was found that graduate science and engineering enrollment increased in the fall of 1974 for the first time since fall 1970. From fall 1971 to fall 1973, every area of science showed a decrease in enrollment, except the life sciences and psychology in which enrollment has continued to rise. During this period, the number of full-time students dependent on federal support declined from 47 to 26 percent of the total enrollment. By analyses of the surveys conducted between 1967 and 1973, an overall decline of 5 percent in full-time science and engineering enrollment was noted. Also, the number of federally-supported students was reduced by one-half. Academic science obligations decreased by 18 percent below the 1967 level in constant dollars. (Author/CP)

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ED114266

Major Findings of the Survey from an NSF Point of View

by

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Presented before the American Educational Research Association

Session A-30

Washington, D. C.

March 31, 1975

SE 019 159

Major Findings of the Survey from an

NSF Point of View

Mr. Berry has just given you the background on how and why we do the Survey of Graduate Science Student Support. I'd like to show you how the results have been integrated into other data collection efforts and how the time series has been utilized.

First, I'll give you some of the highlights of survey results over a 3-year period, 1971 to 1973. Then, by using an indexing method, I'll demonstrate a longer-term data series that links survey data with the traineeship applications received from 1967 to 1971 for a look at the 7-year period as a whole. And last, I'll discuss some recent findings resulting from a survey conducted in Fall 1974 in a sample of 360 graduate science departments.

In 1973, schools with science Ph.D. programs reported 218,000 students enrolled in graduate programs in the sciences and engineering, three-fourths of whom were studying full time.

Graduate science and engineering enrollment had been dropping continuously since Fall 1970; but in 1974 there are indications that it increased for the first time in 4 years. From Fall 1971 to Fall 1973, every area of science showed a decrease except the life sciences, where there was a 3-year growth

of 3 percent, and psychology, with nearly a 1-percent rise. Based on interviews with some of the survey respondents, the increase in graduate student interest in the life sciences, particularly in the biological sciences, stems from its growing appeal among young adults as a means of satisfying their career aspirations and making a measurable contribution to society. Also, unsuccessful medical school applicants are remaining in related fields of study in order to upgrade their academic credentials while either waiting for future acceptance into medical school or attaining a Ph.D. Psychology is currently one of the most popular undergraduate majors, a field where advanced degrees are very important and where public demand for counseling and guidance services is on the increase.

The number of first-year entrants into graduate school began to show a slight turnaround in 1973 from the 4-percent drop between 1971 and 1972. This apparent reversal may have been influenced by changing attitudes on the part of some students who were previously "turned off" by the prospect of professional careers in certain fields of science and technology. Other factors could be basically economic in origin--the shrinking job market for bachelor's degree holders could be an inducement for students to attain a higher degree that would be more in demand.

Full-time enrollment absorbed the bulk of the total decrease, amounting to 5 percent between 1971 and 1973; an increase in part-time enrollment only partially offset this loss, rising nearly 4 percent. The shift to part-time study indicated a greater dependence by students upon employment in order to complete their graduate education.

The number of full-time students dependent upon Federal support, which amounted to 43,200 students in 1973, represented a decline of 21 percent since 1971, and every area of science reflected this dropoff, at rates ranging from 15 percent in engineering to 33 percent in the mathematical sciences. While Federal support to students dropped precipitously during this period, support from the non-Federal sector, which aided 121,100 students in 1973, rose nearly 3 percent, with engineering and the mathematical sciences showing the only decreases in enrollment.

The first slide illustrates the distribution of these full-time students according to two traditional support mechanisms and the portion of that financial assistance provided by the Federal Government (Chart 1). In earlier years these mechanisms played a predominant role in the support of graduate students. Currently, the principal type of support, which is not shown on the chart but accounts for 31 percent of the students, is support provided by the students themselves. Note that students holding fellowships and traineeships accounted for only 21 percent of the total in 1973 and research assistants, 23 percent. Teaching assistantships, which are not shown, accounted for the remaining 26 percent of full-time students.

The change in utilization of various mechanisms of support over the years also characterized the sources of such support. The next chart illustrates these shifts between the Federal and non-Federal sectors (Chart 2). In 1967, data reported by doctorate departments on NSF traineeship applications indicated that Federal support went to 42 percent of all full-time students; by 1973, such support was

CHART 1

GRADUATE ENROLLMENT IN SCIENCE AND ENGINEERING IN DOCTORATE - GRANTING INSTITUTIONS, 1973

	NUMBER	PERCENT
• FULL-TIME STUDENTS:		
• TOTAL	164,300	100
• FEDERALLY SUPPORTED	43,200	26
• FELLOWSHIPS-TRAINEESHIPS:		
• TOTAL	34,100	21
• FEDERALLY SUPPORTED	18,100	11
• RESEARCH ASSISTANTS:		
• TOTAL	36,100	22
• FEDERALLY SUPPORTED	20,700	13

SOURCE: NATIONAL SCIENCE FOUNDATION

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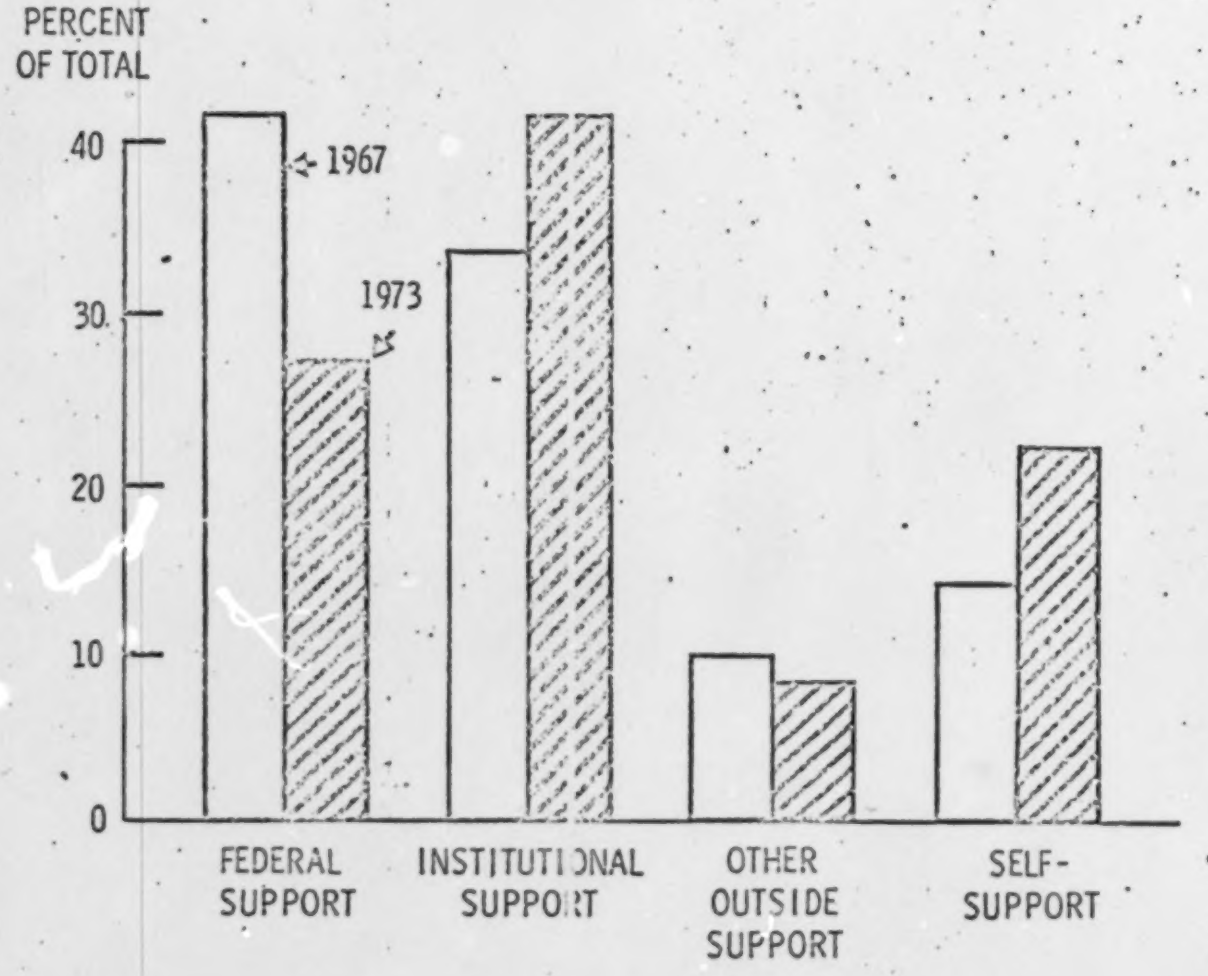
Chart 2

DISTRIBUTION OF FULL-TIME GRADUATE SCIENCE STUDENTS, BY SOURCE OF MAJOR SUPPORT, 1967 AND 1973



SOURCE: NATIONAL SCIENCE FOUNDATION

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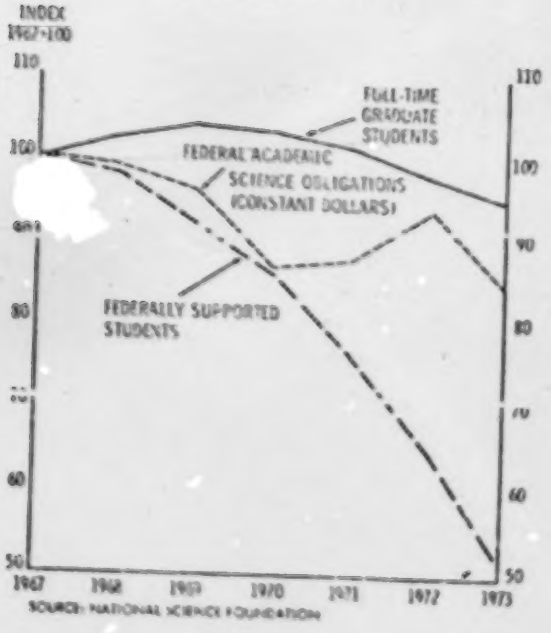
received by only 27 percent. Concurrently, the institutions themselves, and State and local governments, provided financial support to 42 percent of all full-time students in 1973, up from 34 percent in 1967. Note also the increasing proportion of students who were self-supporting.

Because of the shifting size of the universe from which these data were extracted, it was important to devise a method of linking the two data bases together to produce long-terr trend analyses. The applications for traineeships during the period 1967 through 1971 came from a different number of departments and institutions each year, so that absolute numbers were never available to provide national science and engineering enrollment levels. Similarly, both the surveys of 1972 and 1973 were sent to an expanded universe of departments; this increase in coverage each year also precluded the formation of national totals. Therefore, a statistical method was devised which allows us to examine the responses from departments that have reported consistently for 3 or 4 years. This "matching" process enabled us to examine short-term trends, which then become the basis for an index, using 1967 as the base year, that allowed us to determine characteristics of the student population over the entire 7-year period.

Using this normalized index, we related the number of full-time graduate students and the federally supported portion to the constant dollar equivalent of Federal academic science obligations in order to determine the effects of changes in Federal funding patterns to universities and colleges (Chart 3). An overall decline of 5 percent in full-time science and engineering enrollment was indicated during the 1967-73 period, and the number of federally supported students were reduced by half. Meanwhile, academic science obligations were 18 percent below the 1967 level in constant dollar terms.

Chart 3

Federally supported graduate science students and Federal academic science obligations, 1967-73



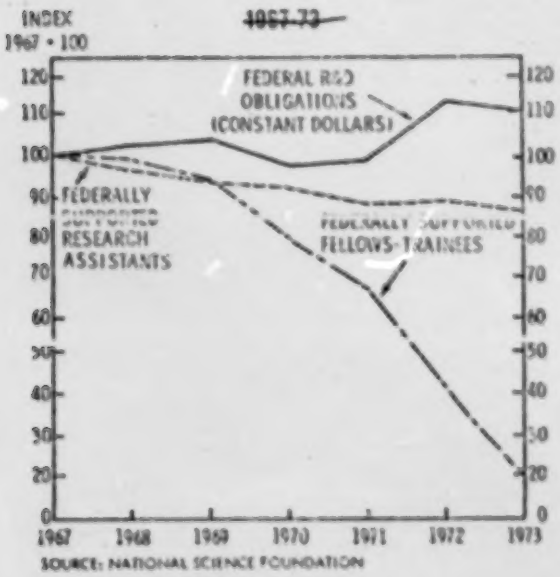
Federal R&D obligations made up three-fourths of all Federal academic science support in 1973, and, when converted to an index in constant dollar terms, showed an increase of 11 percent from 1967 to 1973. (Chart 4). However, this increase was not translated during the period into increases in federally-supported students. On the contrary, the number of research assistants dependent on Federal sources dropped 13 percent and fellows-trainees went down to 21 percent of their 1967 level.

As the number of research assistants declined and the Federally supported number dropped even more, postdoctoral appointees were increasingly utilized by universities and colleges. (Chart 5). The 1973 survey showed that 69 percent of all postdoctorals were supported on Federal projects; thus as Federal R&D obligations rose, a shift occurred between the use of postdoctorals and graduate research assistants. The downturn in postdoctoral utilization in the last year shown on the chart could be indicative of an improved job market in industrial and nonprofit institutions, university faculty appointments, or Federal agencies. Since the overall unemployment rate for scientists and engineers in 1973 was only 1.2 percent, postdoctorals were in a relatively better position for finding employment outside of the academic sector that year.

The survey data can be used in a variety of other ways. For instance, NSF has used them to analyze its own role in the support of graduate science students since the beginning of the Graduate Traineeship Program. In 1967 NSF supported less than one quarter

Chart 4

Federally supported graduate science students, compared with Federal R&D obligations, 1967-73

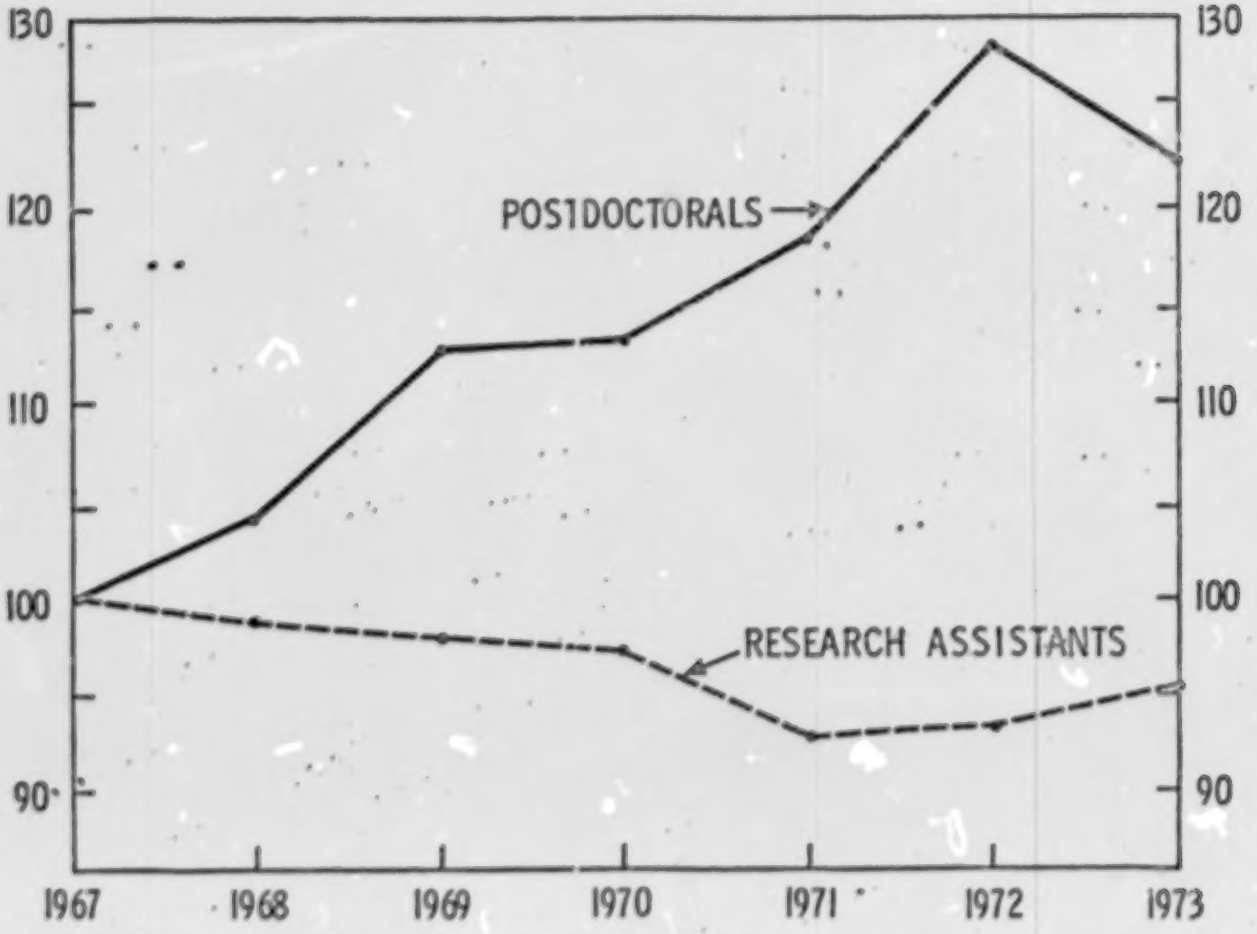


SOURCE: NATIONAL SCIENCE FOUNDATION

CHART 4

POSTDOCTORALS AND RESEARCH ASSISTANTS IN SCIENCE PH.D.-GRANTING INSTITUTIONS, 1967-73

(INDEX 1967 = 100)



SOURCE: NATIONAL SCIENCE FOUNDATION

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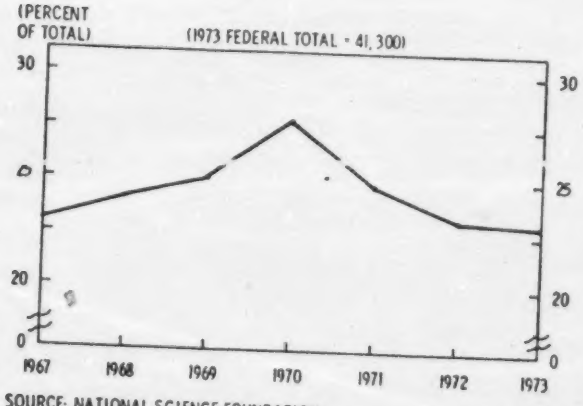
of all federally assisted full-time students, about the same proportion as in 1973. (Chart 6). The dropoff that began in 1970 was due primarily to the phasing out of the traineeship program, as illustrated on the next slide. (Chart 7). Fellows-trainees supported by NSF dropped from a 1970 high of 28 percent of all federally supported fellows-trainees to less than 15 percent of the total in 1973. Meanwhile, NSF supported an increasing share of research assistants working on Federal research projects, rising from 24 percent of the total in 1967 to 34 percent by 1973. (Chart 8). This shift in emphasis by NSF did not reverse the overall drop in utilization of research assistants, as shown earlier.

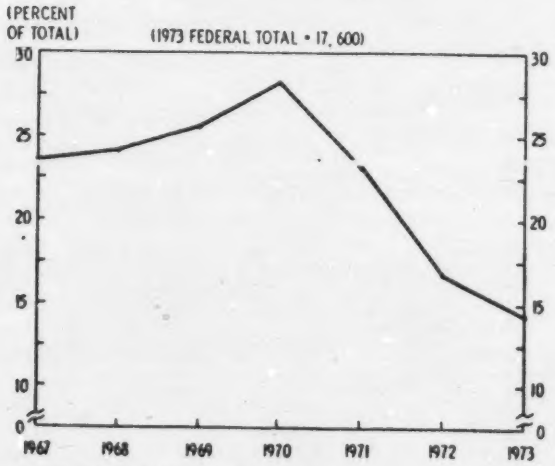
Now let me turn to our recent preliminary enrollment data for the Fall 1974 semester. These recent data came from a Quick Response Survey consisting of a stratified random sample of 360 graduate science departments. This sample survey will be repeated in 1975. Results from the survey indicate that science and engineering enrollment appears to be increasing for the first time since 1969. National estimates were derived from the sample that indicated a 4-percent overall rise in full-time enrollment that was concentrated primarily in the biological sciences. Results of the full-scale 1974 survey will be available soon in preliminary form to allow us to verify this apparent upturn.

Chart 6-Full-time graduate science students supported by NSF as percent of all federally supported graduate science students, 1967-73



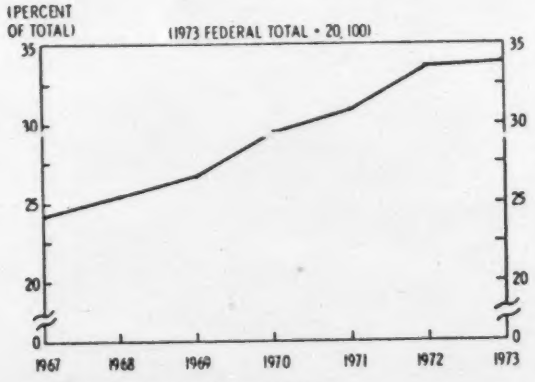
SOURCE: NATIONAL SCIENCE FOUNDATION

Chart 7—Fellows-trainees supported by NSF as percent of all federally supported fellows-trainees, 1967-73



SOURCE: NATIONAL SCIENCE FOUNDATION

Chart 8—Research assistants supported by NSF as percent of all federally supported research assistants, 1967-73



SOURCE: NATIONAL SCIENCE FOUNDATION

In conclusion, I have shown that the continual decline we have seen in graduate science enrollment may have reversed itself in 1974. Indications are that this reversal may have resulted from factors other than the traditional mechanisms of support--undergraduates are faced with difficult times due to economic conditions and are using their own sources of income to finance their graduate education, usually in fields considered "relevant" such as medicine and health. Other data from our NSF surveys indicate that Federal support of academic R&D may be declining and this, plus the financial crises that institutions face because of inflation, probably means that more and more students will have to finance their own graduate education in the future.

I would like to turn the program over now to William Copeland who is Chief of the Manpower Analysis Branch of the Office of Program Planning and Evaluation of NIH. Mr. Copeland has been engaged in occupational employment analysis in some form for almost 20 years, first at BLS in the Department of Labor and beginning in 1968, with NIH. He is currently concerned with the study of professional manpower resources for biomedical education and research and will talk to you today about NIH's objectives in co-sponsoring the Survey of Graduate Science Student Support, particularly in regard to NIH's mission and information needs.